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# INFORMATION REPORT INFORMATION REPORT

## CENTRAL INTELLIGENCE AGENCY

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COUNTRY USSR

REPORT

SUBJECT Soviet Economic Development from  
1951 to 1957

DATE DISTR. 16 January 1959

NO. PAGES 1

REFERENCES RD

DATE OF  
INFO.

25X1

PLACE &  
DATE ACQ.

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52-page document on the development of the Soviet economy from 1951 to 1957. This document was prepared by the Soviets for distribution to Satellite governments, and was classified "SECRET" by the Soviets. A tentative appraisal indicates that the content of the report is already available in overt publications.

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INFORMATION REPORT INFORMATION REPORT

**SECRET****Secret !**Development of the Economy of the USSR 1951-1957 (General Information)

The development of the economy of the Soviet Union in the period 1951-1957 was characterized by enormous progress. During this period the Soviet Union achieved great success in industry, agriculture, science, engineering, the improvement of the material welfare and cultural benefits of the workers.

The rapid tempo of the development of the national economy of the USSR is evident primarily from the data on the increase of the national income. In the period 1951-1957 the national income increased, in comparable prices, by 102%.

The rate of growth of the national income of the USSR, as compared with the development of the national income of the United States, is indicated by the following: (in comparable prices, 1950 = 100)

	<u>1940</u>	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
USSR	61	100	136	171	191	202*
US	62	100	114	120	125	126

\* - incomplete data.

As the table shows, the physical volume of the national income of the USSR more than doubled in the period 1951-1957, whereas the increase in the US was only 26 percent.

More than half the national income in the USSR comes from industry, which is developing at a particularly rapid rate.

The total volume of industrial production in 1957 was 2.3 times that of 1950; this includes the production of production facilities, which increased 2.4 times in the same period. The average yearly rate of increase of industrial

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production in this period amounted to 12.3 %, as compared with 3.6 % in the United States for the same period.

The Soviet Union enjoys a superiority over the Capitalist countries not only with regard to the rate of development of industry, but has caught up with the most highly developed capitalist country of the world, the United States, in the absolute increase of the production of many types.

Average Yearly Rate and Absolute Increase of Production of the Most Important Types of Industrial Production in the USSR and the USA in the Period 1950-1957

	<u>Yearly Rate of Growth in %</u>		<u>Units</u>	<u>Yearly Growth in Amounts</u>	
	<u>USSR</u>	<u>USA</u>		<u>USSR</u>	<u>USA</u>
Iron ore	11.3	0.8	million tons	6.4	1.2
Pig iron	9.9	2.8	"	2.6	1.8
Steel	9.3	2.2	"	3.4	2.1
Electric Power (direct supply)	12.5	9.1	billion kwh	15.7	46.7
Petroleum (not including gas)	14.6	4.8	million tons	8.6	12.5
Natural gas (including gas by-products)	18.2	7.8	billion m <sup>3</sup>	1.8	17.6
Coal (computed on the basis of bituminous coal)	8.5	1.2	million tons	24.6	-6.1
Cement	16.1	3.7	"	2.7	-1.6
Wool fabric	8.9	-6.6	million meters	18.1	-23.2
Leather shoes	6.5	2.8	million pair	16.0	14.7

Thus the USSR has already caught up with or overtaken the United States in the absolute increase of production in the areas of ferrous metallurgy, the coal and cement industry, and in the production of a number of industrial products for popular consumption. In the past 5 years the USSR has shown a

greater yearly increase in petroleum production than has the United States. The USSR is still behind the United States in the absolute yearly increase of production of electric power and gas.

The rapid increase of industrial production has given the USSR the possibility of making significant progress toward the solution of the most important economic problem, that of catching up to or surpassing the most highly developed Capitalist countries in per capita production.

Per Capita Production in the USSR and USA

	<u>1950</u>		<u>Factor of USA Superi- ority</u>	<u>1957</u>		<u>Factor of USA Superi- ority</u>
	<u>USSR</u>	<u>USA</u>		<u>USSR</u>	<u>USA</u>	
Electric power, kwh (direct supply)	474	2,562	5.4	962	4,180	4.3
Coal (computed on basis of bituminous) kg	1,238	3,343	2.7	1,945	2,713	1.4
Petroleum (not counting gas) kg	209	1,758	8.4	482	2,067	4.3
Iron ore, kg	219	657	3.0	413	629	1.5
Pig iron, kg	106	391	3.7	182	420	2.3
Steel, kg	151	579	3.8	250	597	2.4
Cement, kg	56	255	4.5	142	292	2.1
Wool fabric, m	0.9	2.8	3.1	1.4	1.6	1.1
Shoes, pair	1.1	3.2	2.9	1.6	3.5	2.2
Sugar, kg	13.9	14.4	1.04	22.0	12.67	*

(\* - USSR production 1.7 times that of USA)

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The 1957 reorganization of the administration system for industry and construction has improved the industrial situation in the USSR. The removal of barriers, the location of the management near the factories, the removal of the responsibility <sup>to</sup> of the local organizations for the work of the industry, have all contributed to an upswing in the creative initiative of the masses. A number of economic councils have undertaken concrete measures for the development of specialization and cooperation of factories. The plan quotas were fulfilled better. The 1957 plan calls for an increase of industrial production of 1.7 %; actually the increase has been 10 %. In the first quarter of 1958 the total volume of industrial production increased by 11 % over the same period of the preceding year.

On the basis of the superiority of the Socialist society, the Soviet Union has taken on the task of increasing production in the main branches of industry 2 to 3 times in the next 15 years. This means that the yearly production of iron ore will amount to 250-300 million tons, that of pig iron 75-85 million tons, that of steel 100-120 million tons, that of coal 650-750 million tons, that of petroleum 350-400 million tons, that of gas 270-320 million cubic meters, that of electric power 800-900 billion kilowatt hours, and that of cement 90-100 million tons.

The Soviet Union now has the possibility of increasing at a rapid rate the production of consumer goods. On the basis of continued increase of the supply of natural raw materials and the development of a large-scale industrial capacity for synthetic materials, the goal has been set for 500 million meters of wool fabric for 1965, as compared with 282 million meters in 1957, and the production of 1,485 million meters of silk fabrics, which is equal to 1.9 times the 1957 production. The total volume of production of tricot products will be more than doubled and will reach 940 million items.

By 1965 shoe production is supposed to be 515 million pairs, as compared with 315 million pairs in 1957.

Since 1953 there has been considerable progress in agriculture in the USSR.

The measures of the Communist Party for improving the technical basis of agriculture, the assigning of competent cadre to the collective farms, the tractor stations and state farms, the measures taken for increasing the material interest of the farmers, for establishing a new regulation for agricultural planning, have led to great positive results. In the course of the last 4 years, 36 million hectares of new and recovered land have been opened.

In the period 1954-1957, i.e., in the 4-year period following the September plenum of the Central Committee of the CPSU in 1953, the state seizures have increased over the preceding 4-year period as follows: grain 22%, sugar beets 36%, flax almost doubled, cotton 12 %, potatoes 27 %, vegetables 81%, milk 62 %, meat 51 %, wool 41 %. Particular success was had in cattle raising. In the period 1954-1957 the cattle population has increased by 10.9 million head. On the basis of the progress already made, a broad campaign has been launched throughout the country directed toward equalling the United States per capita production of meat, milk and butter. At present, the milk production of our country is about 95% of that in the USA; the total volume of butter production in the USSR already exceeds that of the USA.

The law on the further development of the collective farms and the reorganization of the machine-tractor stations, adapted on 31 March 1958 on the initiative of the Communist Party, will contribute to further acceleration of the development of all branches of agriculture. The plan for 1958 provides for a 17% increase in the gross production of agriculture.

Characteristic of the development of the national economy of the USSR is the continuous increase of the work productivity in all branches of the economy.

The average yearly work productivity of the industrial workers of the USSR increased in 1957 by 64 % over that of 1950, and by 74% in the construction

industry, whereas in the United States the work productivity in industry increased by only 23 percent in the same period. The work productivity in agriculture and other branches of the economy is increasing at a considerably greater rate than in the Capitalist countries.

The significance of work productivity as a growth factor in the case of production is steadily increasing. In the course of the Five Year Plan about 80% of the total growth of the national income and 68% of the growth in industrial production was achieved through an increase of work productivity.

Even greater possibilities for increased work productivity and, on this basis, for increased agricultural and industrial production are opening up to the USSR for the near future.

The reserves of acceleration of economic development are in the reorganization of the management of industry and the building trade, in the improved organization of labor and its system of compensation, in the mighty forward progress of scientific-technical thought and in the raising of qualifications of workers and engineering-technical personnel.

On the basis of the rapid development of the branches of material production, a steady increase in the standard of living of the Soviet people is taking place. The real wages of the workers and employees increased 44 % in the period 1950-1956, and the money and natural income of the farmers on collective and individual farms increased by 68%, computed on the basis of those engaged and in comparable prices.

In 1957 the real income of the workers and employees increased 7 % per each employed, and the money and natural income of the farmers increased 5%. Payments and deductions granted to the people out of the state budget and at the expense of operating costs rose in 1957 by 65% over 1950, whereas, actually, considering the increased purchasing power of the rubel as a result of the lower prices, this growth was even more significant. In the same period, the

total volume of the turn-over of individual trade in the state and cooperative area increased 2.3 times in comparable prices.

Given below is a short description of the natural resources and the development of individual branches of the national economy of the USSR:

### Natural Resources

The Soviet Union has an inevitable complex of mineral raw material deposits. The explored deposits afford the possibility of a further increase of production of raw materials and mineral fuels. At the beginning of 1956, 41% of the known world supply of iron ores, 88% of the manganese deposits, 54% of the potassium hydroxide supply, almost 1/3 the world supply of raw phosphates, 60% of the peat deposits, 57% of the total geological supply of coal (according to 1957 figures), colossal deposits of petroleum, copper, lead, zinc, nickel, bauxite, tungsten, mercury, sulfur and other treasures of the earth were concentrated inside the boundaries of the USSR.

The USSR takes first place among the countries of the world in the available supply of wood.

The distribution of the deposits of natural resources in the area of the USSR does not coincide with the distribution of consumer areas. For this reason, the shipping of the acquired raw materials and fuels requires additional expenditures and, in many cases, the construction of entirely new avenues of transportation and considerable capital investments. Many of the newly discovered deposits are located in the eastern parts of the country, which are little developed and accessible only with considerable difficulty.

### Coal

The estimated total available coal deposits in the entire area of the USSR amount to 7,487 billion tons, of which 500 billion tons are in the economically undeveloped areas (northern and northeastern Siberia, particularly the Lena, Tunguz, and Taymyr basins).



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As of 1 January 1957 the explored coal deposits in the USSR were

as follows:

	Reserves Given in Financial Statement				Reserves Not Given in Financial Statement		
Republic	T O T A L		of which:				
	Billion Tons	%	A + B + C <sub>1</sub>		C <sub>2</sub>		
			Billion Tons	%	Billion Tons	%	

Republic	T O T A L Billion Tons	%	A + B + C <sub>1</sub> Billion Tons	%	C <sub>2</sub> Billion Tons	%	
USSR (total)	300.0	100	155.1	100	125.1	100	19.8
RSFSR	189.9	63.3	93.2	60.2	89.1	71.3	7.6
UkSSR	47.9	16	39.8	25.7	6.5	5.2	1.6
GeorgianSSR	0.6	0.2	0.33	0.2	0.25	0.2	0.02
Kazakh SSR	53.7	17.9	18.2	11.7	26.4	21.1	9.1

In the other republics there are insignificant deposits of coal (from 1 to 0.01% of the total reserves). There is no coal in the Baltic States, Belorussia, and Azerbaydzhan. In certain areas (Urals, Central USSR, Georgia, Eastern Baikal), the available coal deposits are not of sufficient quantity nor quality to satisfy local needs. The main deposits of high-grade coal are in the Donets, Kusnez and Pechora coal basins.

In the European part of the USSR exploration and operations are being conducted at the following deposits: Donets, Dnepr, and Lvov-Volynsk basins in the South; the Moscow basin in the Central Russian area; and at Pechora in the North.

The coal reserves given in financial statements (Bilanzvorraete) in the European part of the USSR amount to 27 % of the deposits found in the entire Soviet Union, whereas in 1956 the coal mined here was 223 million tons or 55 % of all the coal mined in the Soviet Union.

Donbas (Donets Basin) is the most important fuel base in the country and has large reserves of coal for use in technology and for producing power; it is the chief area for the supply of coking coal. Industrial output has been going on for some time at Donbas. The coal veins are, for the most part, not very thick --

about 0.5 - 1.0 meter thick. At the central field at Donbas, the mining of industrial coal has already reached a depth of 500-800 meters from the surface, and the mining of coking coal has reached a depth of 700-1,000 meters. An increase of the output is possible on the basis of the discovery of deeper horizons, through the utilization of thinner seams, and through the intensification of the exploration work on new fields with gas coals in the western part of the basin, which involves an increase in the prime costs of mining coal.

The Dnepr Basin has a supply of low-quality brown coals which cannot be transported over long distances. The brown coals of the Ukraine have a local importance. Since they are mined for the most part in open-pit operations and have a rather high calorific rating, these coals are utilized as power-producing coals for local industry, railroads and other purposes.

The Lvov-Volynsk Basin has limited reserves of deep-lying, thin coal seams.

Pechora produces both power coals and coking coals. The potential power coal supplies of Pechora are sufficient to satisfy the needs of the North, the Northwest, Leningrad, and part of the Urals. The main deposits are beyond the Arctic Circle and are located from 1,500 kilometers (Nizhne-Tagilsk Ural area) to as much as 1,700 kilometers (Cherepovetsk works) away from the consumer areas, and the transportation of coal to the Urals requires the construction of a new railroad line at least 850 kilometers in length.

The Moscow Basin is located favorably in the central part of the European part of the USSR, which is a decisive factor for the intensive development of coal mining here, regardless of the poor quality of the coals and of the geological mining difficulties. The coals obtained in the Moscow basin do not completely cover the needs of the industrial establishments of the Central areas, for which reason both technological and high-quality coals are shipped here from the southern and eastern areas of the country.

[REDACTED]

The Urals have both hard and brown coal deposits. The coal reserves given in financial statements amount to 1.6% of the reserves in the entire Soviet Union, whereas the amount of coal mined is 11% of that mined in the entire Union. The fuel balance of the Ural industrial area is critical. The lack of real promise in regard to an increase of available coal reserves in the Ural area makes it necessary to find new deposits in Kazakhstan and other areas bordering on the Ural region. At the present time, the coal requirements of the Ural area are being met by supplies from the Kuznetsk and Karaganda basins.

Kazakhstan has both hard and brown coal. The hard (bituminous) deposits are rich, and the seams in some cases are very thick. A characteristic of all Kazakhstan coal is its high ash content. The most important basin is Karaganda with its coking coals.

Southern Siberia has a number of coal deposits, which amount to 43 % of all the coal reserves given in financial statements. The amount mined here, however, is only somewhat over 20% of all the coal mined in the USSR and comes chiefly from the Kuznets basin. More than 50% of the coal mined at Kuzbas is shipped to the Urals, to the European part of the USSR and to Central Asia.

Eastern Siberia has the following important coal fields: Kansk-Achinsk, Irkutsk, and South Yakutsk. Eastern Siberia has the colossal Tungus basin with practically inexhaustable reserves, but since the area is so inaccessible and little explored, no development of coal mining facilities is to be expected in the next few years. The same applies for the Taymyr, Lena, and Zyryanskoye basins.

#### Iron Ores

In accordance with the geological study of the USSR area, the estimated supplies of rich and readily concentrated iron ores amount to 28 billion tons, of which 10 billion tons are to be found in the Belgorod area.

The Soviet iron ore reserves given in financial statements as of 1 January 1957 amounted to 71.1 billion tons, of which 35.3 billion tons was in categories A + B + C<sub>1</sub>, and 15.1 billion tons in categories A + B. The greatest iron-ore deposits, about 89% of all deposits in the USSR, are concentrated in the Ukraine, Central USSR, Kazakhstan and Ural. Significant deposits have also been discovered in Eastern Siberia and in the Northwestern regions.

According to technological properties, the discovered reserves of iron ore in the USSR are classified as follows:

<u>Types of Ore</u>	<u>Reserves Given in Financial Statements as of 1 January 1957</u>		<u>1956 Production of Raw Ore</u>	
	<u>Million tons</u>	<u>%</u>	<u>Million tons</u>	<u>%</u>
Rich ores which require no concentration	5,157.3	14.6	51.0	53.5
Readily concentrated ores	21,079.4	59.7	44.3	46.5
Ores requiring complicated concentration methods	9,076.7	25.7	-	-
Total iron ores in USSR	35,313.4	100	95.3	100

The ore deposits which require no concentration are relatively few. They are the rich ores of Krivoy Rog and certain rich magnetite-martite ores and the ores of KMA [Kursk magnetic anomaly] (Mikhaylov, Lebedin, Stolin, Yakovlevka, and Gostishchevo deposits).

Although there are large iron-ore reserves in almost all the main economic areas of the country, these reserves are exploited quite unevenly by industry. The Ukraine and Ural produce about 87.5% of all the USSR iron ore, and only 12.5% is produced in Western Siberia, the northwestern regions, the central regions, Transcaucasia and Kazakhstan.

For the entire USSR the status of industrial ore openings is as follows:

Status	R e s e r v e s   a s   o f   1 Jan 1957			
	A + B	A + B + C <sub>1</sub>		C <sub>2</sub>
	Million tons	Million tons	%	Million tons
In operation	3,065.7	4,786.7	13.6	893.6
Construction work and preparation for operation	4,548.8	11,416.6	32.3	7,307.8
Explored	2,596.0	7,684.9	21.8	8,943.2
Can't be opened	4,940.8	11,425.2	32.3	19,300.1
Explored accurately but can't be opened	4,870.5	9,373.1	26.5	10,922.0
Total in USSR	15,151.3	35,313.4	100	36,444.7

The considerable expansion of ferrous metallurgy planned for the immediate future is to be accomplished through further development of the Krivoy Rog area and the procurement of ores from new areas of Kazakhstan, the northwest, and of the Kursk magnetic anomaly (KMA), as well as through improvement of the capacities in the mining operations. In addition to the expansion of the mining of rich ores, great attention will be devoted to the opening of low-grade but readily concentrated ore mines in the areas mentioned above and to the utilization of the (tobacco-colored)ores of the Kerch fields, which are difficult to concentrate.

#### Central Regions

The total reserves of iron ores of the central regions as of 1 January 1957 amounted to:

Iron-Ore Area	A + B	A + B + C <sub>1</sub>	%	C <sub>2</sub>	1956 Production of Raw Ore
	million tons	million tons		million tons	million tons
Kursk Magnetic Anomaly	2,951.2	7,133.1	98.4	8,029.1	0.526
Belgorod	1,555.5	3,071.9	42.3	2,385.8	0.526
Kursk	1,395.7	4,061.2	56.1	5,643.3	-
Tula	33.0	66.2	0.9	6.2	0.612
Lipetsk	15.6	36.5	0.5	1.3	0.823
Other areas	5.7	15.8	0.2	129.4	-
Total for central regions	3,005.5	7,251.6	100	8,166.0	1.961
including iron quartzites	2,486.5	5,792.3	79.9	5,849.3	0.526

The deposits of the Kursk magnetic anomaly are made up of siderite-martite ores containing 50-58 % iron and iron quartzites containing 30-35 % iron. Since 1953 large deposits of rich martite-hematite ores with an iron content of 56-67% have been discovered and explored in the area of the Kursk magnetic anomaly.

The reserves of the Kursk magnetic anomaly given in financial statements are given as follows:

- a) siderite-martite ores: 581,801,000 tons
- b) iron quartzites: 5,792,320,000 tons
- including magnetite  
quartzites: 4,431,057,000 tons.

Of this total, magnetite-iron quartzite fields are being mined with an output of 293,703,000 tons.

It must be admitted, however, that the ores of the Kursk magnetic anomaly are, for the most part, located deep within the earth -- 5,000-6,500 meters deep -- and will be mined in the future only under rather difficult hydrogeological conditions. Only in the mines prepared for operation in Lebedin and, in part, in Mikhaylov are the ores to be found at depths of 50-100 meters.

Economic calculations show that, in the mining of rich ores of the Kursk magnetic anomaly on a large scale, the prime costs of a ton of ore will not exceed the admissible average prices. The economic significance of this iron-ore region necessitates the surmounting of technical difficulties which complicate operations. The iron-ore reserves of the Kursk magnetic anomaly can and must be utilized, both in the interest of the development of Soviet industry as well as for the needs of the national economies of the Peoples Democracies.

The Tula iron-ore region is characterized primarily by brown iron ores with an iron content of 35-50 percent; the reserves of the region now in operation amount to 18,934,000 tons.

The other central areas are characterized by brown iron ores with an iron content of 30-40 percent. The reserves of the region now in operation amount to 4,072,000 tons.

The ores now being mined do not satisfy the requirements of the metallurgical industry of the central areas, which depend very much on the delivery of rich ores from the Krivoy Rog fields. On the other hand, the mines in the central areas are not yet fully utilizing their planned capacities. The task of developing the ferrous metallurgy of the central regions can be carried out fully only through opening up the deposits of the Kursk magnetic anomaly, including the recently opened Belgorod deposit, which are among the richest iron-ore reserves in the USSR. Actually, the opening up of the Kursk magnetic anomaly is just getting started.

The Ukraine ranks first of all Soviet regions in the mining of iron ore and second in the amount of total reserves given in financial statements. Here are the USSR's most important fields, Krivoy Rog and Kerch. The rich ores of Krivoy Rog account for about 39% of all the iron ore mined in the USSR.

The iron-ore reserves given in financial statements in the Ukraine are characterized by the following figures:

Region	Balanced reserves as of 1 January 1957				1956 raw ore production million tons
	A + B	A + B + C <sub>1</sub>	%	C <sub>2</sub>	
	million tons	million tons		million tons	
Krivoy Rog	3,365.4	8,331.3	77.0	13,613.7	42.137
Kerch	1,285.4	1,654.3	15.3	431.0	3.846
Others	323.2	834.1	7.7	690.2	-
Ukrainian SSR total:	4,974.0	10,819.7	100	14,737.9	45.983

The Ukraine deposits have primarily rich hematite-martite-magnetite ores with an iron content of up to 60 percent. There are also large deposits of iron quartzites.

In Krivoy Rog and Dnepropetrovsk fields the reserves reported in financial statements were as of 1 January 1957 (A + B + C<sub>1</sub>):

- 1) rich iron ores: 1,686,164,000 tons  
including siderite-martite ores 88,861,000 tons
- 2) iron quartzites: 6,645,102,000 tons  
including magnetite iron quartzites 1,109,052,000 tons

In the area now in operation these reserves are as follows:

- 1) rich iron ores: 1,586,829,000 tons
- 2) iron quartzites: 3,364,318,000 tons  
including magnetite iron quartzites 307,965,000 tons.

Among the large areas of iron ore deposits, this area is characterized by the presence of a large amount of rich ores which require no concentration. In the Krivoy Rog fields are concentrated about 33 percent of all the Soviet iron ores given in financial statements.



Ural

The Ural iron-ore deposits consist chiefly of brown iron ores with an iron content of 25-45 percent, red iron ores 22-50%, magnetite of 40-50 %, and even up to 60%, martites and ores with admixtures of other metals (titanomagnetites, iron-chromium-nickel ores), and siderites with an iron content of up to 35 %.

Rich ores requiring no concentration make up about 32-33% of all the iron ores mined in Ural.

The "balanced" [given in financial statements] iron-ore reserves of Ural are as follows:

<u>Reserves as of 1 January 1957</u>				<u>1956 raw ore production</u>		
<u>A + B + C<sub>1</sub></u>	<u>%</u>	<u>A + B</u>	<u>C<sub>2</sub></u>	<u>"Balanced"</u> <u>Reserves</u>		
<u>million tons</u>		<u>million t</u>	<u>million t</u>	<u>million t</u>	<u>million t</u>	<u>%</u>
5,773.5	100	2,019.6	4,278.5	796.5	37.45	100

Manganese Ores

The total geologically estimated reserves of manganese ores in the USSR amount to 500 million tons, of which 310 million tons are ores which are rich and readily concentrated.

The explored "balanced" manganese ore reserves as of 1 January 1958 are estimated at 2,186,000,000 tons according to categories A + B + C<sub>1</sub> and at 913,000,000 tons according to categories C<sub>2</sub>. The main mass (96.8%) of the explored reserves of rich and readily concentrated manganese ores is to be found in three deposits: Nikopol' (980 million tons), Bolshoy Tokmak (851 million tons) in the USSR and in the Chiatura field (104.7 million tons) in the Georgian SSR.

Petroleum and Gas

In order to guarantee an increase of petroleum and gas production, the continuous discovery of new deposits in the various parts of the country is required, whereby the accrueement of explored reserves must greatly exceed the increase of production. Although the geologists have been quite successful in recent years, the tempo of exploratory work, especially in the eastern regions, must be accelerated.

In 1957 the total distance of exploratory drillings for petroleum and natural gas amounted to 2,868,000 meters, and the total will be much greater in the years following 1957 (the total was 2,200,000 - 2,400,000 meters during the Five Year Plan). In connection with the development of the gas industry, 400,000 meters of exploratory and preparatory drillings were carried out in regions of gas deposits; this amounts to 15% of all the exploratory drillings in the USSR.

The extensive exploratory work in the period 1951-1957 resulted in the discovery of over 500 petroleum and gas deposits. More than half the newly discovered deposits are in the Ural-Volga geological province. In 1957 the industrial reserves of petroleum in the USSR were much greater than in 1950. In the United States, the explored petroleum deposits have increased somewhat less than in the USSR during the past 10 years, although the amount of drilling work done in the US was 6.5 times as much as that done in the USSR.

It must be admitted that the USA, in its many years of attempting to keep its petroleum production at a high peak, has already explored a considerable part of its petroleum deposits, even exploited them, whereas the USSR is just beginning to work in this direction. For this reason, aside from the already high status of explored deposits of petroleum in the USSR, the conditions for the exploration of new deposits are more favorable here than in the United States. The amount of drilling work in the USSR is much less than that in the United States; nevertheless, according to a number of technical-economic indices for

drilling operations, and especially according to the rate of mechanical drilling, the USSR is ahead of the United States.

As a result of the discovery of new deposits, the center of the petroleum production of the USSR has shifted to the Volga region and the Urals. Especially rich deposits have been found in the Tatar and Bashkir ASSR, in Kuibyshev and Stalingrad regions. In the Ural-Volga petroleum regions more than 100 petroleum deposits have been found, 68 of which have already been put into operation.

Nevertheless the available reserves in the individual districts (rayons) cannot guarantee the required increase in production. These are the areas of Central Asia, Kazakhstan, Ukraine, etc. In connection with the marked increase in the demands of the national economy for petroleum products and the 1972 goal of 400 million tons, immediate efforts must be made to increase the geological exploration, particularly in the newer industrial areas of the country; prospecting work must likewise be increased in the Volga region and in the Urals and Central Asia.

Recently, the exploratory work has been extended to Central Asia, and new promising districts have been found.

At present, the big consumers of petroleum, Siberia and Central Asia, cannot produce enough to satisfy their own needs, and for this reason large amounts of petroleum are being shipped from the southern regions and the Volga region to the east. Because of the great distances and in view of the expected increase in the required amounts of petroleum in the future, the construction of a petroleum pipeline thousands of kilometers long from the southern and Volga regions to Siberia has been approved.

Up until recent years, little attention was devoted to the exploration of gas deposits. Recently the situation has changed: In a number of areas large gas deposits were found (Stavropol, the Volga region, the Ukraine, the Krasnodar area, Azerbaydzhan, the Komi ASSR, the Zhumen area, and the Yakutsk ASSR).

The industrial reserves of gas in the USSR increased considerably in the period 1951-1957.

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In view of the extraordinary economical efficiency of this type of fuel and its importance for the development of many branches of industry, especially chemistry, the extraction and production of gas is to be increased 13-15 times in the next 15 years. The planned increase in the extraction of gas has not yet been assured on the basis of explored deposits, which means that the exploratory work must be increased, particularly in the Ukraine and the Northern Caucasus, in order to supply the industrial cities of the Ukraine and the central and northwestern regions with gas, in the regions of the Azerbaydzhan SSR in order to supply the Transcaucasian regions, and in the Volga regions and the regions of Western Siberia in order to supply the Urals and certain areas of Siberia.

The problem of supplying the regions of Central Asia and Ural with Central Asian gas is connected with the discovery of gas deposits in Uzbekistan, which has the largest reserves (Gasla).

In the USSR there are rich deposits of nonferrous and rare metals, which guarantee the development of nonferrous metallurgy, the chemistry of the defense industry and of other branches of the national economy.

The USSR stands first in the world in explored deposits of copper, lead, nickel, zinc, bauxite, tungsten, and mercury.

The prospecting and exploration activities conducted during the Five Year Plan have provided a reliable basis of mineral raw materials for the further development of the production of nonferrous and rare metals. The "balanced" reserves of copper according to categories A + B + C<sub>1</sub> were increased 32 % for 1951-1955; they were almost doubled for lead, and increased 3.7 times for bauxite and 52 % for zinc. The explored reserves of tin, molybdenum, tungsten and other scarce metals were also increased.

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Most of the large deposits with industrial reserves of copper are already being worked. Of special importance is the area of Dzhezkazgan, as well as a number of other large deposits in Kazakhstan, at Kounrad [Kounradskiy], Boshchekulsk, Nikolayev, and other places. The large copper smelter at Balkhash uses the ores from Dzhezkazgan.

Bauxite deposits are concentrated primarily in the eastern areas of the country, where about 75% of all the "balance" reserves are to be found; this includes 36% in Ural, 23% in Siberia, and 15% in Kazakhstan.

Aluminum can be produced not only from bauxite, but also from the Kola nephelines (1.1 billion tons reserve), as well as from Armenian nepheline-syenite (100 million tons), alunites from Eastern Siberia (about 70 million tons), and nephelinic rock (about 500 million tons) from Eastern Siberia. The reserves of nephelines and alunites are greater than those of bauxite, which affords the possibility of organizing new centers of aluminum production.

In 1954 rich diamond fields and actual diamond deposits were discovered in the Yakutsk ASSR in the region of the so-called Siberian platform. Until that time practically no diamond deposits were known in the USSR, outside the Ural area. According to all information, this discovery is on a par with the well-known South African deposits. The discovery of this deposit makes the question of a deficit of this raw material for industrial and other purposes untenable.

#### W o o d

As of 1 January 1956, out of the entire forest area of the USSR, 637 million hectares were being worked; the total reserves of this active area amount to 70 billion cubic yards of wood, of which over 53 billion cubic yards are ripe or overripe.

The forests of the Soviet Union are not only of tremendous size but also of the best quality; they consist primarily of conifers, which find the greatest number of uses in all areas of production and construction. Of the entire forest reserves now being worked, about 61 billion cubic meters or 87% consist of conifers.

The forests could stand a yearly harvest of 1.5 billion cubic meters of raw timber, instead of the 350 million cubic meters now (1957) being harvested. Nevertheless, the status already reached in the production of wood has been connected with large yearly investments and huge expenditures of labor and money.

The peculiar feature of the forests of the USSR is their extremely ununiform distribution over the area of the country. In the Asiatic part of the USSR contains 86% ripe and overripe wood, the greatest part of which is in relatively inaccessible places.

The distribution of the wood reserves, which is primarily caused by natural conditions, is adversely influenced to a considerable degree by the unsystematic plundering of the forests which took place before they went over to state control, and by the mass destruction of the forests by the Germans during World War II.

As of 1 January 1956, the reserves of ripe and overripe conifers of the state forests being worked (which assures the raw material basis for wood production) were distributed as follows among the individual areas of the USSR:

	<u>Billion m<sup>3</sup></u>	<u>%</u>
Conifers, ripe and overripe, total:	47.8	100
Western Siberia	4.7	10.0
Eastern Siberia	28.1	58.8
Far East	7.7	16.1
North	3.9	8.2
Urals	1.5	3.1
Northwest	1.0	2.0
West and South	0.1	0.2
Central Areas	0.6	1.3

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Such a distribution of the forests, in which the share of the most highly developed areas in the central, southern, western, and northwestern regions makes up only 3.6% of the total forest resources of the country, clearly characterizes the lack of uniformity between the areas of greatest supply and greatest demand and is the cause of the difficulties which arise in the development of the wood industry and in the organization of the supply of the national economy and the population with wood.

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### Chemical Industry

The production of the chemical industry at the present time is playing an important role in the guarantee of continuous technical progress, in the expansion of the raw material basis for production, in raising further the standard of living of the people, and in the solution of the most important economic problem of the USSR. Without doubt, the chemical industry is one of the most effective and profitable branches of the national economy. The extraordinary and important role of chemistry in the guarantee of technical progress is explained by the fact that its production methods, involving the chemical transformation of substances with the use of catalysts, extremely high and extremely low temperatures, positive pressures and vacuum, electrolysis and electrothermy, radioactive isotopes, etc., are connected with the highest degree of productivity.

In view of the great importance of chemistry in the modern age, the May plenum of the Central Committee of the CPSU (1958) gave special attention to the subject and passed an appropriate resolution on the acceleration of the development of the chemical industry of the USSR and especially of the production of synthetic materials and the products produced from such materials. The solution of this problem under prevailing conditions is of great national and political importance.

The development of the chemical industry of the USSR is watched over continuously by the CPSU and the Soviet government. Immediately after the war, great sums were provided for the restoration of the chemical plants (more than half of which were put out of action) and for new construction. The chemical industry of the USSR developed at a much greater rate than did Soviet industry in general. As compared with a growth factor of 3.9 for industrial production in general in the period 1940-1957, the production of the chemical industry increased by a factor of 5. In the period 1950-1957 these growth factors were 2.3 and 2.9, respectively. The Soviet chemical industry is expanding its production much more rapidly than the chemical industry of the most highly developed Capitalist countries and now ranks second in the world in total volume of production.

The production of the most important products of the Soviet chemical industry in the post-war period as compared with the pre-war year 1940 is characterized by the following data:

	Unit	1940	1950	1955	1957
Gross production of the chemical industry (including rubber-chemistry and mining-chemistry)	%	100	192	413	517
Raw phosphates (computed on basis of 100% $P_2O_5$ )	thousand tons	374.3	617.4	1,109	1,229.8
"	%	100	165	396	326
Sulfurous raw materials (computed on basis of 100% S)	thousand tons	404	760	1,571	1,660.7
"	%	100	188	589	411



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The Soviet Union has an extensive and well developed industrial capability, the production of which is increasing at an extraordinarily rapid tempo.

Rate of Growth of Gross Industrial Production  
(1950 = 100)

	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
All industry:	116	130	145	165	185	205	226
Group A:	117	131	146	166	191	212	326
Group B:	116	128	144	163	176	193	209

In Soviet industry, a predominant development in the area of heavy industry is constantly being assured. The portion of production representing the producing of production facilities increased to 68.8% of the gross industrial production in 1950 and to 70.8% in 1957. It must be admitted, however, that the difference in the rate of growth of groups A and B has decreased in comparison with the pre-war five year plans. In the case of Group A in the period 1929-1940, the average rate of growth per year was 21.2%, and 12.6% in the case of Group B; in the period 1951-1957, however, this rate was only 13.0% and 11.1%.

In these 7 years essential changes took place in the branches of the structure of industrial production: In connection with the accelerated rate of development, the portion represented by machine building, by the chemical and petroleum industries, as well as by the building materials industry increased even more on the basis of gross production and the number of persons employed.

The growth of production in the most important branches of industry can be seen from the following information (1950 = 100):

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	<u>1951</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u> (incomplete data) 25X1
Total industry:	116	145	185	1,956	2.3 times
Machine building and the metal working industry:	118	159	220	251	2.9 times
Machine building only:	120	169	243	283	.....
Ferrous metallurgy (including ore extraction)	116	145	179	198	2.1 times
Nonferrous metallurgy (including ore extraction)	116	152	195	210	2.3 times
Fuel industry	110	132	163	175	1.9 times
Electric power plants	115	150	196	221	2.5 times
Chemical industry (including rubber and asbestos industry)	121	158	215	243	2.7 times
Building materials industry	126	167	229	254	3.1 times
Wood and wood working industry	112	121	146	153	1.7 times
Light industry	119	143	178	190	2 times
Food and luxuries industry	114	138	160	175	1.9 times

The branched structure of industry in the USSR is changing in that preferred development is afforded those branches which are the basis for further technical development in the entire national economy. As seen from the figures above, the most rapid rate of development has been in the building materials industry, machine building, the chemical industry, and the power industry.

The increase in the production of machine building facilities afforded the possibility not only of equipping new plants with modern equipment, but also of replacing the equipment at facilities already in operation. Nevertheless, the scale on which this replacement has been going on is still too small. Soviet machine building, together with the scientific research institutes, in 1951-1957, created more than 7,770 very important new types of machines and equipment, over 3,000 of which represent new types created during the last 2 years.

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In spite of the high rate of development in the chemical industry, this industry has not yet come near to satisfying the needs of the national economy and of the people; for this reason, the goal has been recently set of increasing considerably the production of chemical products, especially the production of organic synthetics.

The high rate of development of the building materials and cement industries has been responsible for a continuous increase in the amount of investment in construction work in the USSR.

It must be admitted, however, that the development of the branches of the raw materials and fuel industries is still lagging behind the increasing needs of the manufacturing industries and the other branches of the national economy. Serious efforts are being made in the direction of providing a favorable balance in metals, wood, and a number of chemicals.

One characteristic feature of the development of Soviet industry in the period 1950-1957 has been the accelerated development of the eastern regions. The shifting of industry, especially the extraction industries, to the eastern regions of the USSR, where the chief supplies of raw materials and fuels are to be found, has increased the load on the transportation routes which connect Siberia and Kazakhstan with the central and western regions of the country. The expansion of traffic facilities on these transportation routes, however, is lagging behind the steadily growing needs of the national economy with respect to the moving of goods.

The Fuel and Power Industry  
(coal, petroleum, gas, electric power)

The Soviet Union has a capable fuel and power basis which essentially satisfies the needs of the national economy for fuel and electric power.

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Fuel Production and Electric Power Production  
in the USSR

Year	C o a l		Petroleum		G a s		Electric power	
	million tons	% of 1950	million tons	% of 1950	billion cubic meters	% of 1950	billion kilowatt hours	% of 1950
1940	165.9	63.5	31.1	82.2	3.2	54.9	48.3	52.9
1950	261.1	100	37.9	100	6.2	100	91.2	100
1955	391.3	149.9	70.8	186.9	10.4	167.6	170.2	186.6
1956	429.2	164.4	83.8	221.2	13.7	221.3	192.0	210.1
1957	463.4	177.5	98.3	259.6	20.2	326.9	209.5	230.0
1958 (plan)	489.3	187.4	111.6	294.3	31.1	495.1	231.0	253.2

In comparison with the pre-war status, the coal production increased in 1956 by a factor of 2.8, petroleum production by 3.2, gas production by 6, and electric power production by 4.3. This indicates clearly the rapid tempo of development in the fuel and power industry.

The extraction of the main types of fuel (coal, petroleum, natural gas, peat, shale, firewood) and the production of power by hydroelectric power plants in the USSR, converted at 7,000 unit fuel calories, compares with that of the United States as follows:

	(in million tons)				1956 to 1950 in %	1956 to 1937 in %
	1937	1950	1955	1956		
USSR	190.4	319.0	492.5	529.1	166	278
USA	848.8	1214.4	1367.4	1457.8	120	172

In the rate of growth of its fuel and power basis, the USSR is steadily catching up to the USA and steadily breaching the gap. Whereas the USA produced 4.5 times as much fuels and hydroelectric power as the USSR in the year 1937, in 1956 it produced only 2.8 times as much as the USSR.

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Nevertheless, the development of the fuel and power basis of the country in the same period lagged behind the rate of growth of over-all industrial production. In the years 1937-1956 the gross production of all industry in the USSR increased by a factor of 5.13, and the production of the chief types of power increased by a factor of 2.78.

In the USA the deviation of the curve of the growth of industrial production from the dynamics of production of the main types of power was less during this period: Industrial production increased by a factor of 2.34, and power production by 1.72. The unsatisfactory rate of development of the fuel and energy basis in the USSR created certain difficulties in the supply of the national economy with fuels and electric power.

The fuel consumption situation in the USSR and in the USA is shown by the following figures:

	U S S R		U S A	
	1950	1955	1950	1955
Total consumption	100	100	100	100
Industry and construction	58.9	63.5	49.9	53.9
Agriculture	2.7	2.8	1.6	1.7
Transportation	22.2	20.9	24.7	22.3
Community and home consumption	16.2	12.8	23.8	22.1

Note: In the comparison, the fuel consumption in agriculture includes for both the USSR and the USA only the consumption of fuel for tractors and combines. If all fuel consumption in agriculture in the USSR were included, this portion would be 5% greater in 1950 and 6% greater in 1955.

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The figures show the higher amount of fuel consumed by industry and the building trade in the USSR, and the lower amount consumed (even less in 1950-1955) in community and household establishments.

During the period in question, the pattern of the fuel basis in the USSR, with respect to power sources, was subject to only insignificant changes, even though considerable shifts were planned, which must be put into effect in the coming years.

#### Fuel Balance of the USSR

(converted on the basis of standardized fuel types)

<u>Year</u>	<u>Total</u>	<u>Coal</u>	<u>Petroleum</u>	<u>Natural Gas</u>	<u>Peat</u>	<u>Shale</u>	<u>Firewood</u>
1940	100.0	59.1	18.7	1.9	5.7	0.3	14.3
1950	100.0	66.1	17.4	2.3	4.8	0.4	9.0
1955	100.0	64.8	21.1	2.4	4.3	0.7	6.7
1957	100.0	61.6	24.4	4.0	3.9	0.7	5.4

As can be seen from these figures, the fuel resources picture began to change in the USSR after about 1955. In 1957 coal represented 61.6% of the total fuel resources, whereas natural gas represented only 4.0% and petroleum 24.4%. From the point of view of the national economy, natural gas and petroleum are the most profitable types of fuel in the USSR.

The economic efficiency of natural gas and petroleum can be seen from the following table:

#### Economic Indices in the Extraction of Various Types of Fuels in 1956 (converted to standardized fuel types)

	<u>Prime Costs</u>	<u>Work Productivity</u>
Natural gas	100.0	100.0
Petroleum (including gas by-products)	276.0	37
Coal	881.0	0.6

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Thus the prime costs for natural gas (converted to standardized fuel types) is only about 1/3 that of the comparable amount of petroleum and only 1/8 that of the comparable amount of coal. Nevertheless, because of the wrong policy in the technology area, petroleum and gas extraction has developed at an unsatisfactory rate. Only in the last few years were conditions established, on the initiative of the Central Committee of the CPSU, for a rapid increase in the production of these types of fuels.

Petroleum and Gas

Petroleum extraction increased from 37.9 million tons in 1950 to 98.3 million tons in 1957, and the extraction of gas increased from 6.2 billion cubic meters to 20.2 billion cubic meters in the same period.

In the plan for the year 1958 great attention is given to increasing the extraction of petroleum, and especially of gas. The capital investments in this branch will be increased by 4 billion rubels or 30.5% in 1958 over the 1957 figure. Petroleum extraction is supposed to reach 112 million tons, which is 13.3 more than in 1957, and the extraction and production of gas will increase correspondingly by 30.7 billion cubic meters or 52% over that of the previous year.

Two-thirds of all petroleum extraction is concentrated in the Ural region and the area of Povolsha, and one-third in the Caucasus (including the Azerbaydzhan SSR), which played an important role in the development of the petroleum industry before the war.

The discovery of extraordinary petroleum deposits in the areas of Povolsha and Ural, the geological characteristics of which are quite different from those of the Caucasus, provided the main impetus for the development and extensive application of a new technology of extracting petroleum deposits in the USSR, which led to an actual revolution in the petroleum extracting industry.

In comparison with the petroleum deposits in the Baku area, the productive levels of which have 40-50 thick oil bearing strata, the chief deposits in the Ural and Volga regions have a productive level only 4-30 meters thick, and the number of levels does not exceed two or three.

Because of this, the petroleum experts of the USSR were assigned the complex task of finding out just which methods of extraction make possible the use of the least number of drillings from low-capacity levels to guarantee the satisfactory output of petroleum. This problem was successfully solved by Soviet scientists and specialists, who introduced during the postwar years some new methods of forcing the petroleum out with water pumped along the edges of the oil-bearing strata. The method of adding water outside the contours was supplemented by the method of adding water inside the contours, which guarantees an additional increase of petroleum extraction. The method of adding water outside the contours provided the national economy with a saving of about 3 billion rubels.

At present, other methods of intensifying petroleum extraction are being developed and used successfully in the industry, especially such a promising method as the hydraulic bursting of relatively impermeable petroleum-bearing strata, which affords the possibility of increasing the average outflow of borings as much as 2-2.5 times.

The Soviet petroleum industry went its own way — which was different from that of the USA and other Capitalist countries — in the development of drilling techniques. Most drilling work in the USSR is done with the aid of hydraulic counterboring motors — turbine drills — which were developed by Soviet specialists.



The amount of turbine drilling done in comparison with the total amount of drilling operations is shown by the following:

	<u>1946</u>	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>
% of all drilling operations	6	23	54	83	85

The rapid development of the turbine drilling method has assured a high tempo of drilling operations in the richest petroleum fields of the Eastern areas of the USSR (Bashkir and Tatar republics, Kuybyshev area, etc.), which are characterized by extremely hard rock.

Because of the use of the new methods, the rate of mechanical boring has increased during the past six years: The rate for operational boring increased 2.3 times and was 9.75 meters per hour in 1956; the rate for exploratory drilling increased 2.56 times and was 4.37 meters per hour.

The Soviet Union introduced the technique and technology of boring deep wells with electric drilling equipment. The experiences gained in such operations show that the electric drilling equipment is especially effective and provides more favorable indices than turbine drilling when the borings are made in depths greater than 2-3 thousand meters and when complicated boring conditions, necessitating the use of heavy drilling fluids, must be faced. The use of electric drilling equipment provides the solution to the very serious technological problem of deep drilling operations and increases the area of application of down-pointing drilling machines. Measures are now being taken in the USSR for the development of the production of electric drilling equipment.

The Soviet petroleum refining industry developed in the post-war period primarily in the direction of satisfying the demands of the country for motor fuels and lubricants. This was the result primarily of the fact that

both industry and agriculture had gone over to a wide-scale use of diesel tractors and power equipment, and aviation went over to the use of jet engines. The number of diesel-powered ships in river and ocean shipping increased considerably and many railroad lines have introduced diesel operation in the last few years. The changes in the dimensions and designs of power equipment have caused a very rapid increase in the consumption of diesel fuel. In the post-war period the consumption of diesel fuel increased more than 11 times, which takes into account an increase in agriculture of more than 40 times the amount of diesel fuel.

In keeping with the increased demands, the petroleum refining industry in the USSR has undergone an intensive development. During the 5th Five Year Plan (1951-1955) alone the volume of oil refining became almost twice as great as it was in 1950, and that of raw-material cracking increased 1.9 times. In the same period, oil production increased 1.6 times.

In the 6th Five Year Plan the rate of development of the oil refining industry increased even more. Oil refining has increased by 35% in the last two years, and raw-material cracking has increased 29%, which takes into account an increase of 59% for catalytic cracking.

In recent years the USSR introduced the methods of catalytic reforming, of hydro-purification and of carbomide deparaffination of the fractions of diesel fuel, of coking the petroleum residues in unheated chambers, etc. The introduction of these methods has provided the solution to the problem of improving the quality of gasoline for automobiles and of diesel fuel, and of increasing the yield of bright oil products from petroleum. Production was organized for a wide variety of petroleum products obtained from the sulfurous petroleum of the Ural and Volga regions.

Another characteristic feature is the ever increasing "depth" of the petroleum refining process in the USSR. In comparison with 1950, the yield

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of bright petroleum products from the refined petroleum increased by 8.7 %. This increase is connected both with the increased amount of extracted and processed petroleum of the Eastern fields, which have a high content of light fractions, and with the increased amount of activity in the cracking process in the over-all picture of petroleum refining. In spite of this, the USSR still lags behind the USA in the yield of bright products in the processing of petroleum.

Both during the 5th Five Year Plan and in the ensuing years, gasoline and diesel fuel, with very high tonnages, were the main products. The rate of increase of the production of the individual petroleum products is not uniform. The increase in the production of diesel fuel has been very sharp. With a total increase of bright products by a factor of 2.2 in the 5th Five Year Plan, the production of automobile gasoline increased by a factor of 2.4, and that of diesel fuel by a factor of 4.1 in the same period.

With the considerable increase in the production of diesel fuel, automobile gasoline and other bright petroleum products, there was a strong drop in the production of such petroleum products as tractor oil and ligroine, which sank from 17.5% in 1950 to 3.7% of all the processed petroleum in 1957. In the period 1951-1957 there was a considerable increase in the production of diesel oils and transformer oils, but only a relatively slight increase in the production of automobile oil and industrial oils.

The extraction of natural gases is one of the youngest industries in the USSR, but it has progressed at a rate never before experienced by any other branch of industry.

Whereas the increase in the extraction and production of gas amounted to a total of 4.2 billion cubic meters in the period 1951-1955 (not including coking and producer gas), the gas extraction in the USSR alone in the year 1956 increased by 3 billion cubic meters and in 1957 by more than 6.5 billion. In 1958 the growth will equal that of the entire preceding Five Year Plan period

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and is expected to be 10-12 billion cubic meters; in the years after that, it is expected to be 15-16 billion cubic meters per year increase.

The increase of natural gas extraction in the near future will amount to about 1/3 of the entire increase of all fuel resources in the USSR. Such a rate of development in the gas industry will bring about fundamental changes which will guarantee not only considerable economic efficiency, but also a considerable and continuous technical progress in all branches of the national economy and a considerable improvement of the cultural and material living conditions of the people.

In the exploitation of the gas deposits, more and more use will be made of the method of hydraulic bursting of the strata, perforation of the boreholes under pressure, the exploiting of several strata with one borehole, and the use of injector pumps in the gas deposits, which will make it possible to utilize the high pressure of the boreholes to lift the gas out of strata under low pressures.

### Coal

In spite of the rapid progress in the petroleum and gas industry of the USSR, the basic fuel of the USSR is still coal, and the status of coal mining still determines the status of the fuel balance of the country.

	<u>Growth of Coal Mining in the USSR</u>						
	(in million tons)						1957/1950 in %
	<u>1940</u>	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	
Bituminous coal	140.0	185.2	224.3	276.6	304.0	328.5	177
Brown coal	<u>25.9</u>	<u>75.9</u>	<u>96.1</u>	<u>114.7</u>	<u>125.2</u>	<u>134.9</u>	<u>179</u>
Total	165.9	261.1	320.4	391.3	429.2	463.4	177
Total, converted to standardized fuel (7,000 cal)	140.5	205.7	252.3	310.8	325.1	354.9	173

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The table shows that bituminous coal and brown coal increased at about the same tempo. The calorific value of the coal, however, is dropping, which means that the coal output converted to standardized fuel is lagging behind absolute output.

The technical status of the coal industry of the USSR is rising continuously. In 1956 the chief methods of coal production were mechanized as follows:

Notching and digging of coal	99.0 %
Loading coal in evacuated areas on inclined seams	36.1 %
Drift mining of coal along the path of conveyance	99.7 %
Loading of coal and rock during the striking of main preparatory horizontal drifts	49.7 %
Loading of coal on railroad cars	99.9 %

The loading of coal in the seams on the conveyer belt and the loading of coal and rock during the striking of the preparatory drifts are still the methods requiring the greatest number of workers, whose operations are being mechanized with the use of mining combines. The number of combines in the main coal mines have increased as follows:

1940	24 combines, including sinking combines:	none
1950	707 combines, including sinking combines:	19
1955	2,339 combines, including sinking combines:	194
1956	2,872 combines, including sinking combines:	258

Open pit mining, with the greatest economic efficiency, amounted to 65.7 million tons = 16.8% in 1955, and 78.7 million tons = 18.3 % in 1956, as compared with 25.0% and 25.0 % in the United States and 40.9% and 41.3% in West Germany.

The USSR still is behind the United States in the volume of coal beneficiation. The amount of coal subjected to mechanical beneficiation

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in the USSR increased from 16.5 % in 1950 to 25.9% of all the coal mined in 1955, whereas the increase in the United States was from 38.5% to 60.7%.

The 1958 plan calls for an increase of coal production in the USSR to 489.3 million tons, which is 5.6 % greater than the preceding year. The open pit mining is increasing, especially in the Ural region, Kazakhstan and Siberia. In 1958 open pit mining is expected to account for about 19% of all the coal mined in the USSR.

As far as over-all volume in coal mining is concerned, it is apparent that the USSR will catch up to the United States in the years 1958-1959.

#### Electric Power

The production of electric power in the USSR in the period 1950-1957 increased more than over-all industrial production. In this period, electric power production increased from 91.2 billion kilowatt hours to 209.5 billion kilowatt hours, or by 130 %, whereas gross industrial production increase by only 126 %. Nevertheless, with the rapidly increasing demand for electric power by both the national economy and the people, the increased production of electric power is not yet sufficient to meet the requirements. Furthermore, the production of electric power in the USSR increased over industrial production by a smaller margin than in the United States — 3% greater increase in the USSR and 44% increase in the United States.

The primary indices for the electrification of the national economy of the USSR can be seen from the following table:

	<u>1940</u>	<u>1956</u>
Capacity of electric power plants in million kwh:	11.2	43
Capacity of motors for driving machines in industry, million kwh:	16.9	57.7
Coefficient of electrification of processes with power consumption (capacitywise):	83.8	89.1
Electric power consumption in industry billion kwh:	32.1	126
% for driving motors	22.0	79.5
% for technological purposes	68.8	62.6
Electric power consumption in agriculture, billion kwh:	0.5	4.8

The table shows that the electrification of the production processes in industry has been almost completed in the USSR. Another characteristic feature is the steady increase of the portion of electric power consumption in industry for technological purposes, which is connected with technological progress. It must be admitted, however, that the status of electrification in agriculture is still not satisfactory; at the beginning of 1957 only 34% of the collective farms were electrified. The use of electric power for household consumption is relatively low.

In the period 1950-1957 there has been no great change in the pattern of electric power consumption in the national economy. Because of the extent of the electrification of the railroads, the portion of electric power consumed by transportation facilities has been increasing steadily: from 2.8% in 1950 to 3.2% in 1955. The portion of electric power consumed by the electric power plants themselves increased from 5.7% in 1950 to 6.4% in 1955. The power losses within the distribution networks have been decreasing; in 1955 they amounted to 6.0%.

In the period 1950-1957 there were a number of great technical successes in the development of the power economy in the USSR, such as putting into operation the greatest hydroelectric power plant in the world at Kuybyshev, the initiation of the construction of even greater power plants on the Volga and Angara rivers, the building of high-capacity thermal power plants out of batteries of boiler turbines together with the use of new steam ratings. The Leningrad Metallurgical Works, for example, produced as early as 1952 a turbine with a capacity of 150,000 kilowatts, designed for steam ratings of 170 atmospheres gauge and 550/520°. During the year, a turbine with a capacity of 200,000 kilowatts was built. The prototype of a topping turbine with a capacity of 100,000 kilowatts and a condensation turbine with a capacity of 300,000 kilowatts, and steam ratings of 300 atmospheres gauge and 650°, was developed, and is to be manufactured in the near future; work was also begun on the design of a turbine with a capacity of 600,000 kilowatts for superhigh steam ratings.

The transition to high ratings is being accompanied by a continuous increase of the efficiency of power equipment and by a decrease of the consumption of fuel for the production of electric power, even though the USSR in this regard is still lagging somewhat behind the United States.

Fuel Consumption per KWH of Electric Power in the USSR

and in the United States, converted to standardized

<sup>\*</sup>  
fuels (7,000 cal) (in grams)

	<u>1950</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>
USSR	543	511	498	480	463
USA	505	464	438	421	417

( \*- In the USSR the portion of consumption of fuel is given per kwh of electric power produced in the district electric power plants; in the USA data is given on the consumption of fuel per kwh of electric power produced for general consumption.)



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Great attention has also been devoted to the development of atomic energy. At present in the USSR several large atomic power plants, each with a capacity of 200-400 thousand kilowatts, are being built.

Of great importance for the improvement of the supply of electric power is the already begun transition to the creation of a uniform power system in the European part of the USSR. The power systems of Povolzha (Volga area) and the central regions were joined through the construction of the high-voltage transmission line from Kuybyshev to Moscow. In the coming years, the power systems of the central regions, of the Ural region and of the southern region will also be unified.

Through the considerable degree of mechanization and automation of the production processes and through the improvement of the organization of production, the work productivity in the fuel and power industry has increased in the same period as follows:

Average Monthly Work Productivity in Branches of Fuel and Power Industry

<u>Year</u>	<u>Coal production</u>		<u>Petroleum production</u>	
	<u>tons per worker</u>	<u>% of 1950</u>	<u>tons per worker</u>	<u>% of 1950</u>
1940	30.6	101.7	69.3	121
1950	30.1	100.0	57	100
1955	37.8	125.6	90	159
1957*	38.9	129.2	122	215

( \* - The figures for coal production up to 1957 were given according to the former Ministry of the Coal Economy, and for 1957 by the Economic Councils)

As early as the end of the 5th Five Year Plan, the work productivity per worker in the coal industry had increased 25.6% over the 1950 figure, and 59% over the 1950 figure for the petroleum industry.

The prime costs for production in the branches of the fuel and power industry in 1957 amounted to 93% of those for 1950 in the case of coal and 63% in the case of petroleum and 68.0% in the case of electric power; and have

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changed as follows during the individual years:

Prime Costs of Production in the Branches of the Fuel and Power

Industry (in % of 1950)

<u>Year</u>	<u>Coal</u>	<u>Petroleum</u>	<u>Electric Power</u>
1950	100	100	100
1955	84	79	75
1956	86	70	69
1957	93	63	68

The increase of the prime costs of coal in the years 1956-1957 is connected to a certain degree with an increase of wages for the workers in the coal industry.

It must be noted that the distribution of the power resources over the territory of the USSR is very ununiform; in the western and eastern regions of Siberia and in the Far East, areas which are far removed from the European part of the USSR, over 60% of the water power resources and more than half the coal deposits, which are suitable for open pit mining in most cases, are concentrated. The prime costs of these coals are in many cases very low — as low as 10 rubels per ton of standardized fuel — and it is possible to mine them in enormous quantities. For this reason, the next Five Year Plan will provide for an accelerated development program for the extraction of fuels and the production of electric power in these areas.

The fuel and electric power balance in the European part of the USSR is still critical. The main source of energy fuels in this area are the Donets and Ural coals and the coals from the Moscow area with an average cost of 100-150 rubels per ton of standardized fuel. These coals, however, are not available in large enough quantities. The fuel shortages are covered by bringing millions of tons from the eastern regions (Karaganda, Kuzbas), which requires additional funds and causes great transportation difficulties.

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The average transportation distance of bituminous coal and coke in the USSR increased from 670 kilometers per ton in 1950 to 718 kilometers per ton in 1956, an increase of 7.2%.

The power systems in the western part of the USSR (Baltic states, Belorussia, Lvov and Moldavia regions) do not have very great capacities and are characterized by an actually critical power balance.

The petroleum and gas picture is much better in the European part of the USSR. The discovery of new large deposits of petroleum and gas in the European part of the USSR and the accelerated development of their extraction methods are showing great promise for the exploitation of the most valuable deposits (coal, peat, shale). In 1958 alone, the delivery of gas to industrial establishments and for household consumption will increase by about 11 billion cubic meters, which will replace about 15 million tons of Donets coal.

#### Ferrous Metallurgy

In the production of ferrous metals, the Soviet Union clearly occupies first place in Europe and second place in the world. In the past 7 years, the gross production of ferrous metallurgical products in the USSR has more than doubled, and increased 3.9 times over that of 1940. It is important in this regard to note that the USSR, in this period, not only has assured a high rate of development for its metallurgical industry, but has overtaken the USA in absolute increase of metal production.

The production of the most important products of ferrous metallurgy in the USSR is indicated by the following figures:

(in millions of tons)

	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
1. Iron ore	39.7	59.6	71.9	78.1	84.2
% of 1950	100	150		181	212
2. Pig iron	19.2	27.4	33.3	35.3	37.0
% of 1950	100	143	174	186	193
3. Steel	27.3	38.1	45.3	48.7	51.1
% of 1950	100	140	166	178	187
4. Rolled products	20.9	29.4	25.3	37.8	40.2
% of 1950	100	141	169	181	192

In spite of the considerable increase in the production of ferrous metallurgical products, the metal balance in these years remained critical. The production of rolled products has remained behind the increased demands of the various branches of the national economy. The lack of metals will hold up production in machine building, and the demand for railroad rails, for shipbuilding and for the automotive industry will not be satisfied. A lack of rolled products for construction work in the capital investments category is apparent.

The steel mills are not getting the required amount of pig iron, the production of which is limited by the capacities of the blast furnaces and by the lack of iron ores and coke.

During the report period, changes have been made in the quality of ferrous metallurgical techniques. Increased technological and engineering techniques have demanded increased production of alloyed and low-alloy steels, close tolerances, new rolled steel shapes, tubes, standards, cold-drawn and cold-rolled steel products and other finished products.

In connection with the increased demand, the production of high-quality steel in the USSR has increased 3.5 times in the past 10 years; this includes

a sixfold increase in the number of types of heat-resistant and stainless steels and steels with special properties. Considerable changes have been made in the classification of ferrous metal products: a considerable increase has been made in the production of fine and cold-rolled sheets, tubes, rolled steel shapes, etc. It must be admitted, however, that the changes of quality have not yet fully satisfied the demands of the national economy. This leads to an excessive consumption of metal and retards technical progress.

Types of Production of Ferrous Rolled Metal Products  
in the USSR

	thousand tons				% of total			
	<u>1940</u>	<u>1950</u>	<u>1955</u>	<u>1957*</u>	<u>1940</u>	<u>1950</u>	<u>1955</u>	<u>1957*</u>
Total rolled products, ferrous	13,113	20,888	35,339	40,169	100	100	100	100
Tube and forged from ingot	654	902	1,357	1,512	5.0	4.3	9.9	3.8
Semifinished for rolling at other plants	1,079	2,071	3,586	4,725	8.2	9.9	10.1	11.8
Finished rolled products	11,380	17,915	30,396	33,932	86.8	85.8	86.0	84.5
Quality rolled products	2,793	3,992	6,783	-	21.3	19.1	19.2	-
Unalloyed rolled material	8,587	13,923	23,613	-	65.5	66.7	68.8	-
<u>Of all finished rolled material</u>					<u>% of finished rolled material</u>			
Shaped steel	5,309	7,635	12,289	-	46.6	44.1	40.4	-
Steel sheet	2,650	4,766	8,976	10,248	23.2	26.6	29.5	30.2
All steel rails	1,360	1,751	2,882	2,233	12.0	9.8	9.5	6.6
Rolled wire	680	1,043	2,196	2,679	6.0	5.8	7.2	7.9
Beams and [-steel	531	1,368	1,575	2,080	4.7	7.6	5.2	6.1
Semifinished pipe	367	941	1,701	2,003	3.2	5.3	5.6	5.9

( \* - incomplete data)

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As can be seen from these figures, the production of steel sheet more than doubled in the period 1950-1957. The portion of steel sheet in finished rolled material increased from 26.6% in 1950 to 30.2 percent in 1957. This is the most important pattern in the development of rolled steel production. At present, steel sheet is being used more and more in many branches of the national economy. For this reason, the demand for steel sheet is not yet being satisfied, in spite of the increased production. In 1955, the amount of steel sheet used in finished rolled material was 29.5 % in the USSR, and 52.2% in the United States.

The amount of shaped steel in the USSR is relatively high. Nevertheless, the trend toward a change in the types of rolled material is characterized by a continuous increase of steel sheet and decrease of shaped steel and a conversion in machine building/new construction to the more economical types of rolled materials, such as sheet, tubing, bent shapes.

In the classes of rolled material, the proportion of rolled wire has increased considerably, which has resulted from a great increase in the production of reinforced prestressed concrete products and semifinished pipe, in connection with the increased production of pipe.

The pipe industry of the Soviet Union has taken first place in Europe and second place in the world as a result of new constructions and the expansion of already existing facilities. The USSR now produces more pipe than England, West Germany and Belgium put together.

	Steel	Pipe	Production		
	1950	1953	1955	1956	1957
million tons:	2.0	3.0	3.5	3.9	4.2
% of 1950:	100	151	177	192	210

[REDACTED]

At the same time within the over-all pipe production, the portion of electric welded pipe has risen considerably; this type of pipe has been in demand for the construction of gas, oil, and petroleum pipelines and for associated equipment.

	<u>Change in Pipe Production</u>				
	<u>1948</u>	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Seamless pipe	66.2	72.6	67.2	64.2	62.6
Welded pipe	33.0	20.3	19.6	18.4	17.5
Electrically welded pipe	0.8	7.1	13.2	17.4	19.9

Since the gas and petroleum extraction exceeded the pipe production in rate of development in the period 1950-1957, a critical situation has admittedly arisen in the pipe balance, especially in the case of pipes for connections to gas pipelines. The central heating of cities has also been retarded because of the lack of piping.

New facilities for the production of electrically welded and seamless pipe are to be introduced in the coming years. Special pipe mills must be built to cover the demands for very thin-walled pipe and electropolished pipe.

In the technical production indices, the ferrous metallurgy of the USSR has reached the progressive level of world technology.

In the USSR a special school was opened for metallurgical production; one of the accomplishments of this school was the intensification of the utilization of the blast furnace and the open hearth furnace, which in the USSR showed a higher productivity than furnaces of comparable size anywhere in the world.

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The efficiency factor for the available space of blast furnaces in the USSR is as follows (in nominal working period; m<sup>3</sup> per ton)

<u>1940</u>	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
1.19	0.98	0.86	0.80	0.78	0.79

In the last two years no further improvement of the efficiency of the blast furnaces could be achieved, since the supply of iron ore of good quality was plagued with interruptions.

The operation of blast furnaces with high gas pressure on the charging platform found wide usage, and required the development of special designs for the blast furnaces themselves and for blast-furnace equipment. At present, 53 blast furnaces are operating with high pressure; in the coming 2-3 years an additional 6-7 blast furnaces will operate with increased pressure. For all new blast furnaces, a gas pressure of 1.5 atmospheres gauge at the charging platform is proscribed. The experiences gained by the USSR in the operation of blast furnaces in this manner were exploited by the United States, where 28 blast furnaces operated with increased pressure during 1957.

The USSR also worked out the technology of maintaining constant humidity of the blast, on which principle 96 blast furnaces — practically all that could be converted to this type of operation — are now operating.

Along with the humidification of the blast, an increase in the temperature of the blast was introduced (up to 900-950° at the Magnitogorsk combine, and up to 850° in many other plants). Noteworthy experiences have been gained by the blast-furnace experts at Magnitogorsk, who use a tuyere shield, which permits them to use blast temperatures of up to 1,000° with minimum heat losses.

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The use of rich slag [REDACTED] has also increased considerably, which has brought about a 6-8% increase in blast-furnace productivity and a decrease in coke consumption.

The development of steel refining in the past few years has been accompanied by an increase in the holding capacity of blast furnaces, increased heating capacity of blast furnaces, introduction of oxygen-enrichment of the blast in production operations, and a further increase of the productivity of the open hearth furnace.

Average Steel Production per m<sup>2</sup> of Furnace Space of Open Hearth  
Furnaces (in calendar working periods; tons):

<u>1940</u>	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>
4.24	5.36	6.05	6.55	6.98

Through the intensive utilization of production capacities, the mechanization and automation of production processes and improvement of the organization of work, the production per worker in the metallurgical industry is steadily increasing.

	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
1. Pig iron production (on the basis of raw steel) per blast-furnace worker					
in tons:	1,416	1,869	2,169	2,444	2,512
in % of 1950:	100	132	153	173	177
2. Open-hearth steel production per open-hearth worker					
in tons:	747	903	1,048	1,138	1,161
in % of 1950:	100	121	140	152	155
3. Production of rolled ferrous (not counting pipe and forged pieces from ingots) per rolling mill worker					
in tons:	274	310	354	379	392
in % of 1950:	100	113	129	138	143

The increase in the production of ferrous metals required the following corresponding increase in the production of coke:

	<u>Coke Production</u>				
	<u>1950</u>	<u>1953</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
in million tons	27.7	36.9	43.6	46.6	48.6
in % of 1950	100	133	157	168	175

In the same period the production of pig iron increased by 93%, which means that considerably more pig iron was produced than coke. In spite of the decrease of coke consumption per ton of pig iron — to 812 kg in 1956 from 935 in 1950 — the amount of coke produced is still not sufficient to meet the demands of the metallurgical industry in the USSR. It must be admitted that the quality of the coke has dropped considerably in the past few years, in the coking plants of the eastern regions with respect to mechanical strength and ash content, and in certain plants in the southern regions with respect to the sulfur content, which was caused by a deterioration of the composition, and insufficient supply, of the grades of coal used in coking.

In order further to increase the ferrous metal production in the USSR, it will be necessary to increase to a considerable extent the capacities, and consequently the capital investments, in all branches of ferrous metallurgy.

The increased development of ferrous metallurgy is one of the most important problems of industry in the foreseeable future. For 1958, a pig-iron production of 39.1 million tons, or 2 million tons more than 1957, has been planned, and a steel production of 53.6 million tons, which is 2.5 million tons more than in 1957.

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Special attention will be devoted to the problem of bridging the gap in blast-furnace production and increasing the available iron-ore supply. In 1958, 7 blast furnaces will be built and put into operation. Measures will also be taken to make the necessary preparations for putting an additional 7 blast furnaces into operation in 1959. In terms of capacity, this amounts to what was put into operation during the first and second Five Year Plans put together.

Comparable capacities are to be put into operation in 1958 for the extraction of iron ore. In the case of capital investments in ferrous metallurgy, especially for the development of the raw material basis, an increase of 37.5 % over the 1957 figure has been provided for the year 1958.

#### Nonferrous Metallurgy

Nonferrous metallurgy has a leading role in the heavy industry of the Soviet Union. The constant technical progress, especially in aviation, machine building, high-quality metallurgy, mechanization and automation, electronic and radio-engineering developments, and the expansion of the use of atomic energy for peaceful purposes, all make the increase in the production and quality of nonferrous metals and rare metals urgently necessary.

In Soviet nonferrous metallurgy in 1940, 38 elements of the periodic table of Mendeleyev were produced, and 43 in 1950; at present the number has reached 63.

During this period, the extraction of ores of nonferrous metals has developed greatly. The techniques and technology of mining operations have improved; about 50% of the ores are mined in open-pit operations.

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On the basis of the extremely rich deposits which have been found and explored by Soviet geologists, gigantic processing plants for the production of lead, copper, and zinc have been built, and the industrial branches for aluminum, titanium, nickel, cobalt, tin, tungsten, and molybdenum, etc., have been created.

In the 5th Five Year Plan, nonferrous metallurgy developed at a fast pace, which is seen from the following figures:

Growth of Nonferrous Metals Production in 1955 as Compared with 1950

Aluminum:	by 2.8 times
Lead:	2.3 times
Zinc:	2 times
Copper:	1.5 times.

The production of other nonferrous and rare metals likewise increased considerably. The production of several vitally necessary new types of products was also initiated on an industrial scale.

Nonferrous metallurgy also developed at a fast pace in the years 1956-1957, which made it possible to improve the supply of such metals to the economy.

The increase of the production of nonferrous metals was, to a considerable degree, assured by better utilization of the facilities already in operation, by the introduction of new techniques and the improvement of the organization of the work. On the basis of these factors, the increase of aluminum production, for example, was 24% of the entire increase during the 5th Five Year Plan; in the case of copper it was 31%, and lead 36%. The utilization of the capacities of the mining and concentration facilities likewise was improved.

In the work of the nonferrous metallurgical industry, however, there

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are still serious shortcomings. These include heavy losses of nonferrous metals during the concentration of the ores and during smelting. This situation is caused, in part, by a lowering of the metal content in the ores to be concentrated and the increased use of ores which are difficult to concentrate; part of the blame is ascribed to the poor status of the complex utilization of the raw materials, especially in the copper plants in the Ural area.

Soviet nonferrous metallurgy is, at present, faced with serious problems with respect to the increased production and the initiation of the production of new types of products. The increase of capital investments in nonferrous metallurgy is greater than that for heavy industry in general.

As far as trends in capital investments are concerned, great attention is being given to assuring the ore-raw material basis for the copper and lead-zinc industry, to the expansion of the production capacities for aluminum and zinc, to a considerable increase in the production of titanium, magnesium, semiconductor materials, rare metals, rare elements and rare earths for special techniques, and the creation of a powerful diamond industry on the basis of the explored rich deposits in the Yakutsk ASSR.

The advantage of capital investments is being increased in the nonferrous metallurgy field by the concentration of funds in the initiation of operations of those plants which have been completed and those of the uncompleted plants which are most important, by exploiting the largest and most economically advantageous explored deposits, by the organization of the complex utilization of raw materials, utilizing all profitable aspects. If, for example, in the 5th Five Year Plan [rest of document missing]...

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